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Processes

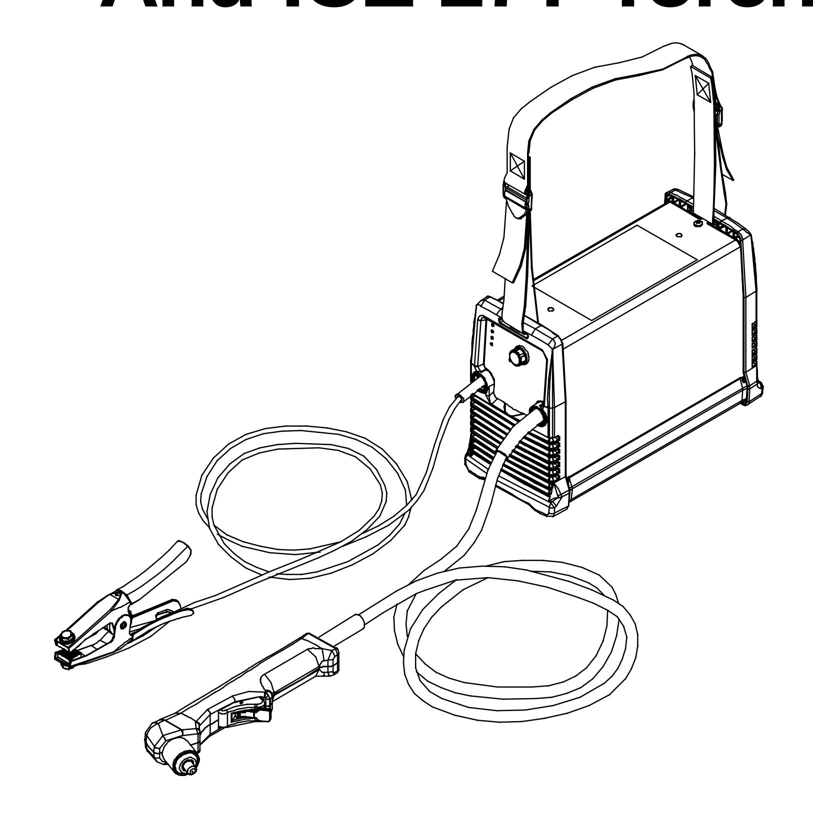

Air Plasma Cutting
and Gouging

Description



Air Plasma Cutter

Spectrum® 375 X-TREME And ICE-27T Torch



OWNER’S MANUAL

File: Plasma Cutters 


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From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don’t have time to do it any other way.

That’s why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn’t afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They’re just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner’s Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We’ve made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there’s a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.



Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.

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Working as hard as you do − every power source from Miller is backed by the most hassle-free warranty in the business.



TABLE OF CONTENTS

SECTION 1 − SAFETY PRECAUTIONS - READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means “Note”; not safety related.*

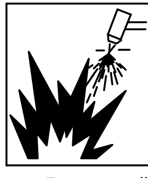
This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Plasma Arc Cutting Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



CUTTING can cause fire or explosion.

Hot metal and sparks blow out from the cutting arc. The flying sparks and hot metal, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any cutting.

- Remove all flammables within 35 ft (10.7 m) of the cutting arc. If this is not possible, tightly cover them with approved covers.
- Do not cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that sparks and hot materials from cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut on closed containers such as tanks or drums.
- Connect work cable to the work as close to the cutting area as practical to prevent cutting current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use plasma cutter to thaw frozen pipes.
- Never cut containers with potentially flammable materials inside − they must be emptied and properly cleaned first.
- Do not cut in atmospheres containing explosive dust or vapors.
- Do not cut pressurized cylinders, pipes, or vessels.
- Do not cut containers that have held combustibles.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Do not locate unit on or over combustible surfaces.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any cutting.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Plasma arc cutting requires higher voltages than welding to start and maintain the arc (200 to 400 volts dc are common), but also uses torches designed with safety interlock systems which turn off the machine when the shield cup is loosened or if tip touches electrode inside the nozzle. Incorrectly installed or improperly grounded equipment is a hazard.

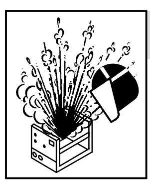
- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not touch torch parts if in contact with the work or ground.
- Turn off power before checking, cleaning, or changing torch parts.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner’s Manual and national, state, and local codes.
- Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet − always verify the supply ground.
- When making input connections, attach proper grounding conductor first.
- Frequently inspect input power cord for damage or bare wiring − replace cord immediately if damaged − bare wiring can kill.
- Turn off all equipment when not in use.
- Inspect and replace any worn or damaged torch cable leads.
- Do not wrap torch cable around your body.
- Ground the workpiece to a good electrical (earth) ground if required by codes.
- Use only well-maintained equipment. Repair or replace damaged parts at once.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Do not bypass or try to defeat the safety interlock systems.
- Use only torch(es) specified in Owner’s Manual.
- Keep away from torch tip and pilot arc when trigger is pressed.
- Clamp work cable with good metal-to-metal contact to workpiece (not piece that will fall away) or worktable as near the cut as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.



ELECTRIC SHOCK can kill.

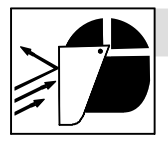
SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER the removal of input power.

- Turn Off unit, disconnect input power, check voltage on input capacitors, and be sure it is near zero (0) volts before touching any parts. Check capacitors according to instructions in Maintenance Section of Owner’s Manual or Technical Manual before touching any parts.



EXPLODING PARTS can injure.

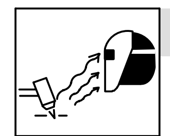
- On inverter power sources, failed parts can explode or cause other parts to explode when power is applied. Always wear a face shield and long sleeves when servicing inverters.



FLYING SPARKS can cause injury.

Sparks and hot metal blow out from the cutting arc. Chipping and grinding cause flying metal.

- Wear approved face shield or safety goggles with side shields.
- Wear proper body protection to protect skin.
- Wear flame-resistant ear plugs or ear muffs to prevent sparks from entering ears.



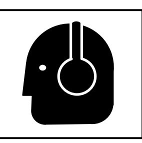
ARC RAYS can burn eyes and skin.

Arc rays from the cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Wear face protection (helmet or shield) with a proper shade of filter lenses to protect your face and eyes when cutting or watching. ANSI Z49.1 (see Safety Standards) suggests a No. 9 shade (with No. 8 as minimum) for all cutting currents less than 300 amperes. Z49.1 adds that lighter filter shades may be used when the arc is hidden by the workpiece. As this is normally the case with low current cutting, the shades suggested in Table 1 are provided for the operator's convenience.
- Wear approved safety glasses with side shields under your helmet or shield.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

Table 1. Eye Protection For Plasma Arc Cutting

Current Level In Amperes	Minimum Shade Number
Below 20	#4
20 − 40	#5
40 − 60	#6
60 − 80	#8



NOISE can damage hearing.

Prolonged noise from some cutting applications can damage hearing if levels exceed limits specified by OSHA (see Safety Standards).

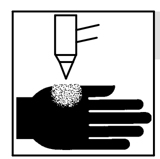
- Use approved ear plugs or ear muffs if noise level is high.
- Warn others nearby about noise hazard.



FUMES AND GASES can be hazardous.

Cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

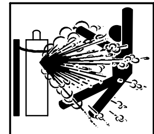
- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove cutting fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals to be cut, coatings, and cleaners.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Fumes from cutting and oxygen depletion can alter air quality causing injury or death. Be sure the breathing air is safe.
- Do not cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the cutting area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes when cut.
- Do not cut containers with toxic or reactive materials inside or containers that have held toxic or reactive materials − they must be emptied and properly cleaned first.



PLASMA ARC can cause injury.

The heat from the plasma arc can cause serious burns. The force of the arc adds greatly to the burn hazard. The intensely hot and powerful arc can quickly cut through gloves and tissue.

- Keep away from the torch tip.
- Do not grip material near the cutting path.
- The pilot arc can cause burns − keep away from torch tip when trigger is pressed.
- Wear proper flame-retardant clothing covering all exposed body areas.
- Point torch away from your body and toward work when pressing the torch trigger − pilot arc comes on immediately.
- Turn off power source and disconnect input power before disassembling torch or changing torch parts.
- Use only torch(es) specified in the Owner's Manual.



CYLINDERS can explode if damaged.

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of metalworking processes, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flame, sparks, and arcs.
- Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
- Keep cylinders away from any cutting or other electrical circuits.
- Never allow electrical contact between a plasma arc torch and a cylinder.
- Never cut on a pressurized cylinder − explosion will result.
- Use only correct gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3. Additional Symbols For Installation, Operation, And Maintenance



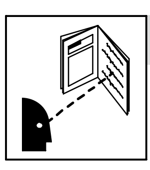
HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on torch.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



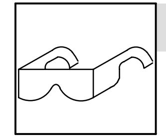
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



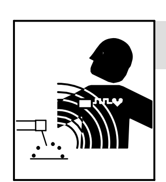
READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine Miller/Hobart replacement parts.



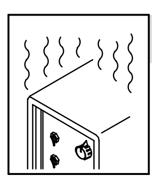
FLYING METAL can injure eyes.

- Wear safety glasses with side shields or face shield.



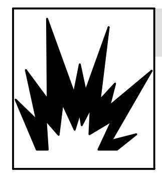
MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near plasma arc cutting operations.



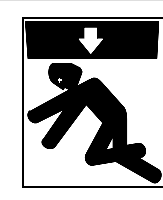
OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce amperage (thickness) or reduce duty cycle before starting to cut again.



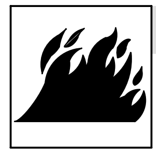
EXPLODING HYDROGEN hazard.

- When cutting aluminum underwater or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece.
- See your cutting engineer and water table instructions for help.



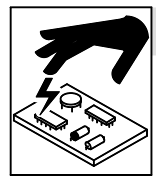
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



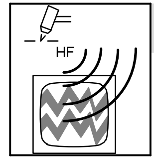
FIRE OR EXPLOSION hazard.

- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring − be sure power supply system is properly sized, rated, and protected to handle this unit.



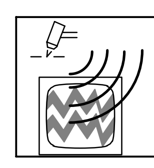
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC CUTTING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- To reduce possible interference, keep cables as short as possible, close together, and down low, such as on the floor.
- Locate cutting operation 100 meters from any sensitive electronic equipment.
- Be sure this cutting power source is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269−9101 (phone: 617−770−3000,website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices−−phone for Region 5, Chicago, is 312−353−2220,website: www.osha.gov).

1-6. EMF Information

Considerations About Welding Or Cutting And The Effects Of Low Frequency Electric And Magnetic Fields

Welding or cutting current, as it flows through the welding or cutting cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep cutting power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the cut as possible.

About Pacemakers:

Pacemaker wearers consult your doctor before welding/cutting or going near welding/cutting operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 − CONSIGNES DE SÉCURITÉ − LIRE AVANT UTILISATION

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▲ **Avertissement : se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.**

2-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*



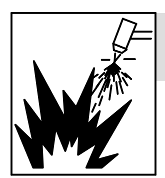
Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

2-2. Dangers liés au coupage à l'arc au plasma

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-4. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



LE COUPAGE présente un risque de feu ou d'explosion.

Des particules de métal chaud et des étincelles peuvent jaillir de la pièce au moment du coupage. Les étincelles et le métal chaud, la pièce à couper chauffée et l'équipement chaud peuvcnt causer un feu ou des brûlures. Avant de commencer à travailler, assurez-vous que l'endroit est sécuritaire.

- Déplacez toute matière inflammable se trouvant à l'intérieur d'un périmètre de 10,7 m (35 pi) de la pièce à couper. Si cela est impossible, vous devez les couvrir avec des housses approuvées et bien ajustées.
- Ne coupez pas dans un endroit où des étincelles pourraient atteindre des matières inflammables.
- Protégez−vous, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.
- Assurez−vous qu'aucune étincelle ni particule de métal ne peut se glisser dans de petites fissures ou tomber dans d'autres pièces.
- Afin d'éliminer tout risque de feu, soyez vigilant et gardez toujours un extincteur à la portée de la main.
- Si vous coupez sur un plafond, un plancher ou une cloison, soyez conscient que cela peut entraîner un feu de l'autre côté.
- Ne coupez pas sur un contenant fermé tel qu'un réservoir ou un bidon.
- Fixez le câble de masse sur la pièce à couper, le plus près possible de la zone à couper afin de prévenir que le courant de coupage ne prenne une trajectoire inconnue ou longue et ne cause ainsi une décharge électrique, d'étincelles ou un feu.
- Ne pas utiliser le coupeur plasma pour dégeler des conduites gelées.
- Ne coupez jamais des contenants qui peuvent contenir des matières inflammables. Vous devez en premier lieu les vider et les nettoyer convenablement.
- Ne coupez pas dans un endroit où l'atmosphère risque de contenir de la poussière ou des vapeurs explosives.
- Ne coupez pas de bouteilles, de tuyaux ou de contenants pressurisés.
- Ne coupez pas de contenants qui ont déjà reçu des combustibles.
- Portez des vêtements de protection exempts d'huile tels que des gants en cuir, une veste résistante, des pantalons sans revers, des bottes et un casque.
- Ne placez pas le poste sur une surface combustible ou au−dessus de celle−ci.
- Avant le coupage, retirez tout combustible de vos poches, par exemple un briquet au butane ou des allumettes.
- Suivre les consignes de OSHA 1910.252 (a) (2) (iv) et de NFPA 51B pour travaux de soudage et prévoir un détecteur d'incendie et un extincteur à proximité.



UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le fait de toucher à une pièce électrique sous tension peut donner une décharge fatale ou entraîner des brûlures graves. Le chalumeau et le circuit de masse sont automatiquement actifs lorsque le poste est sous tension. L'alimentation d'entrée et les circuits internes de l'appareil le sont également. Le coupage au plasma d'arc exige des tensions plus élevées que le soudage pour amorcer et maintenir l'arc (souvent de 200 à 400 V CC), c'est pourquoi on fait appel à des chalumeaux conçus avec un système de verrouillage sécuritaire qui met l'appareil hors tension lorsque la capsule anti−feu est desserrée ou si le tube touche l'électrode à l'intérieur de la buse. Un poste incorrectement installé ou inadéquatement mis à la terre constitue un danger.

- Ne touchez pas aux pièces électriques sous tension.
- Portez des gants isolants et des vêtements de protection secs et sans trous.
- Isolez−vous de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne touchez pas aux pièces du chalumeau si vous êtes en contact avec la pièce à couper ou le sol.
- Mettez l'appareil hors tension avant d'effectuer la vérification, le nettoyage ou le changement d'une pièce du chalumeau.
- Coupez l'alimentation d'entrée avant d'installer l'appareil ou d'effectuer l'entretien. Verrouillez ou étiquetez la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (reportez−vous aux Principales normes de sécurité).
- Installez le poste correctement et mettez-le à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.
- Assurez−vous que le fil de terre du cordon d'alimentation est correctement relié à la borne de terre dans la boîte de coupure ou que la fiche du cordon est branchée à une prise correctement mise à la terre − vous devez toujours vérifier la mise à la terre.
- Avant d'effectuer les connexions d'alimentation, vous devez relier le bon fil de terre.
- Vérifiez fréquemment le cordon d'alimentation afin de vous assurer qu'il n'est pas altéré ou à nu, remplacez−le immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Vérifiez et remplacez les cosses du câble du chalumeau si elles sont usées ou altérées.
- Le câble du chalumeau ne doit pas s'enrouler autour de votre corps.
- Si les normes le stipulent, la pièce à couper doit être mise à la terre.
- Utilisez uniquement de l'équipement en bonne condition. Réparez ou remplacez immédiatement toute pièce altérée.
- Portez un harnais de sécurité si vous devez travailler au−dessus du sol.
- Assurez−vous que tous les panneaux et couvercles sont correctement en place.
- N'essayez pas d'aller à l'encontre des systèmes de verrrouillage de sécurité ou de les contourner.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l'opérateur.

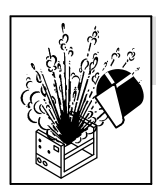
- N'approchez pas le tube du chalumeau et l'arc pilote lorsque la gâchette est enfoncée.
- Le câble de masse doit être pincé correctement sur la pièce à couper, métal contre métal (et non de telle sorte qu'il puisse se détacher), ou sur la table de travail le plus près possible de la ligne de coupage.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.



DÉCHARGES ÉLECTRIQUES potentiellement mortelles.

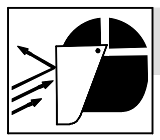
Il y a DES CHARGES DC SIGNIFICATIVES dans le poste de soudage inverseur même APRÈS coupure du courant d'alimentation.

- Mettre l'unité hors tension, mesurer la tension des condensateurs d'entrée et s'assurer qu'elle est pratiquement nulle avant de toucher à l'une quelconque des pièces. Mesurer cette tension conformément aux directives énoncées à la section Entretien du manuel de l'utilisateur ou du manuel technique avant de toucher à l'une quelconque des pièces.



Risque de blessure en cas D'EXPLOSION DES PIÈCES.

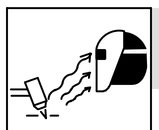
- Mise sous tension, toute pièce défectueuse des sources d'alimentation de l'inverseur peut exploser ou faire exploser d'autres pièces. Pour entretenir les inverseurs, toujours porter un masque protecteur et un vêtement à manches longues.



LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

Le coupage plasma produit des étincelles et projections de métal à très haute température. Lorsque la pièce refroidit, du laitier peut se former.

- Portez une visière ou des lunettes de sécurité avec des écrans latéraux approuvées.
- Portez des vêtements de protection adéquats afin de protéger votre peau.
- Ayez recours à des protège−tympans ou à un serre−tête ignifuges afin d'éviter que les étincelles n'entrent dans vos oreilles.



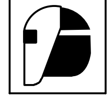
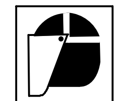
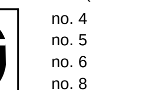
LES RAYONS D'ARC peuvent entraîner des brûlures aux yeux et à la peau.

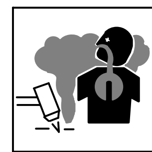
Les rayons d'arc provenant du procédé de coupage produisent des rayons visibles et invisibles intenses (ultraviolets et infrarouges) qui peuvent entraîner des brûlures aux yeux et à la peau.

- Lorsque vous coupez ou regardez quelqu'un couper, portez un casque de soudage approuvé muni de verres filtrants approprié. La norme ANSI Z49.1 (reportez−vous aux Principales normes de sécurité) suggère d'utiliser un filtre de teinte n○ 9 (n○ 8 étant le minimum) pour tout travail de coupage faisant appel à un courant de moins de 300 A. On mentionne également dans la norme Z49.1 qu'un filtre plus faible peut être utilisé lorsque l'arc est caché par la pièce à couper. Comme cela est habituellement le cas pour les travaux de coupage à faible courant, les teintes énumérées au tableau 1 sont fournies à titre d'information pour l'opérateur.
- Porter des lunettes de sécurité à coques latérales sous votre casque ou écran facial.
- Ayez recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements, les étincelles et les éblouissements; prévenez toute personne sur les lieux de ne pas regarder l'arc.
- Portez des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

Tableau 1. Protection des yeux pour le coupage au plasma d'arc

Intensité de courant en ampères	Filtre de teinte (minimum)
Moins de 20	no. 4
20 − 40	no. 5
40 − 60	no. 6
60 − 80	no. 8



LE BRUIT peut endommager l'ouïe.

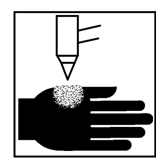
Certaines applications de coupage produisent un bruit constant, ce qui peut endommager l'ouïe si le niveau sonore dépasse les limites permises par l'OSHA (reportez−vous aux Principales normes de sécurité).

- Utilisez des protège−tympans ou un serre−tête antibruit si le niveau sonore est élevé.
- Prévenez toute personne sur les lieux du danger relié au bruit.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le coupage produit des vapeurs et des gaz. Respirer ces vapeurs et ces gaz peut être dangereux pour la santé.

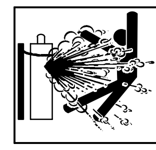
- Ne mettez pas votre tête au−dessus des vapeurs. Ne respirez pas ces vapeurs.
- Si vous êtes à l'intérieur au moment du coupage, ventilez la pièce ou ayez recours à une ventilation aspirante installée près de l'arc pour évacuer les vapeurs et les gaz.
- Si la ventilation est médiocre, utilisez un respirateur anti−vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travaillez dans un espace restreint uniquement s'il est bien ventilé ou si vous portez un respirateur anti−vapeurs. Les vapeurs causées par le coupage et l'épuisement de l'oxygène peuvent altérer la qualité de l'air et entraîner des blessures ou la mort. Assurez−vous que l'air ambiant est sain pour la santé.
- Ne coupez pas dans un endroit près d'opérations de décapage, de nettoyage ou de vaporisation. La chaleur et les rayons d'arc peuvent réagir avec les vapeurs et former des gaz hautement toxiques et irritants.
- Ne coupez pas des métaux enrobés tels que des métaux galvanisés, contenant du plomb ou de l'acier plaqué au cadmium, à moins que l'enrobage ne soit ôté de la surface du métal à couper, que l'endroit où vous travaillez ne soit bien ventilé, ou que vous ne portiez un respirateur anti−vapeurs. Les enrobages ou tous métaux qui contiennent ces éléments peuvent créer des vapeurs toxiques s'ils sont coupés.
- Ne coupez pas de contenants qui renferment ou ont renfermés des matières toxiques ou réactives − vous devez en premier lieu les vider et les nettoyer convenablement.



LE PLASMA D'ARC peut entraîner des blessures.

La chaleur dégagée par le plasma d'arc peut entraîner de sérieuses brûlures. La force de l'arc est un facteur qui s'ajoute au danger de brûlures. La chaleur intense et la puissance de l'arc peuvent rapidement passer au travers de gants et de tissus.

- N'approchez pas le tube du chalumeau.
- Ne saisissez pas la pièce à couper près de la ligne de coupage.
- L'arc pilote peut causer des brûlures − n'approchez pas le tube du chalumeau lorsque vous avez appuyé sur le gâchette.
- Portez des vêtements de protection adéquats qui recouvrent tout votre corps.
- Ne pointez pas le chalumeau en direction de votre corps ni de la pièce à couper lorsque vous appuyez sur la gâchette − l'arc pilote s'allume automatiquement.
- Mettez l'alimentation hors tension et débranchez le cordon d'alimentation avant de démonter le chalumeau ou de changer une pièce du chalumeau.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l'opérateur.



LES BOUTEILLES peuvent exploser si elles sont endommagées.

Les bouteilles de gaz contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Puisque les bouteilles de gaz font habituellement partie d'un processus de travail des métaux, assurez−vous de les manipuler correctement.

- Protégez les bouteilles de gaz comprimé contre la chaleur excessive, les chocs mécaniques, des dommages physiques, le laitier, la flamme, les étincelles et l'arc.
- Installez et attachez les bouteilles dans la position verticale à l'aide d'une chaîne, sur un support stationnaire ou un châssis porte−bouteille afin de prévenir qu'elles ne tombent ou ne basculent.

- Les bouteilles ne doivent pas être près de la zone de coupage ni de tout autre circuit électrique.
- Un contact électrique ne doit jamais se produire entre un chalumeau de plasma d'arc et une bouteille.
- Ne coupez jamais sur une bouteille pressurisée − une explosion en résulterait.
- Utilisez uniquement des bouteilles de gaz, des détendeurs, des boyaux et des raccords conçus pour l'application déterminée. Gardez−les, ainsi que toute autre pièce associée, en bonne condition.
- Détournez votre visage du détendeur−régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque vous utilisez la bouteille ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



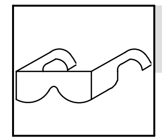
DES PIECES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues.
- Laisser refroidir avant d'intervenir sur la torche.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



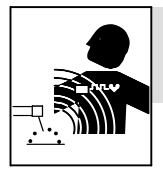
DES ORGANES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour l'entretien.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



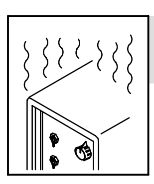
DES PARTICULES VOLANTES peuvent blesser les yeux.

- Porter des lunettes de sécurité avec protections latérales ou frontales.



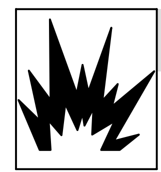
LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs sont priés de consulter leur médecin avant d'approcher les opérations de coupage plasma.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement; respecter le cycle opératoire nominal.
- Réduire l'ampérage (épaisseur) avant de continuer à couper ou réduire le facteur de marche.



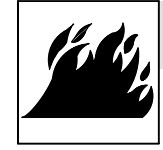
Danger D'EXPLOSION D'HYDROGÈNE.

- Lors du coupage d'aluminium partiellement ou totalement immergé dans l'eau, de l'hydrogène libre peut s'accumuler sous la pièce.
- Consultez votre ingénieur de coupage et les instructions de la table de coupage.



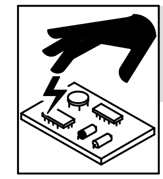
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



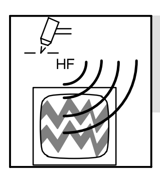
Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique − s'assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.



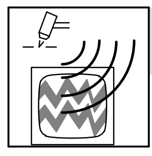
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Etablir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le Rayonnement haute frequence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



LE COUPAGE Ã L'ARC peut causer des interférence.

- L'énergie électromagnétique peut gêner le fonctionnement d'appareils électroniques comme des ordinateurs et des robots.
- Pour réduire la possibilité d'interférence, maintenir les câbles aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à couper à une distance de 100 mètres de tout équipement électronique sensible.
- S'assurer que la source de coupage est correctement branchée et mise à la terre.
- Si l'interférence persiste, l'utilisateur doit prendre des mesures supplémentaires comme écarter la machine, utiliser des câbles blindés de des filtres, ou boucler la zone de travail.

2-4. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux−−le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage ou de coupage passant dans les câbles de puissance crée des causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1. Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.
2. Mettre tous les câbles du côté opposé de l'opérateur.
3. Ne pas courber pas et ne pas entourer pas les câbles autour de vous.
4. Garder le poste de soudage et les câbles le plus loin possible de vous.
5. Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

Les porteurs de stimulateur cardiaque doivent consulter leur médecin avant de souder/couper ou d'approcher des opérations de soudage/couper. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 − DEFINITIONS

3-1. Symbols And Definitions

A	Amperes		Increase		Power Light		Low Air Pressure Light
	Loose Shield Cup Light		Temperature Light		On		Off

SECTION 4 − INSTALLATION

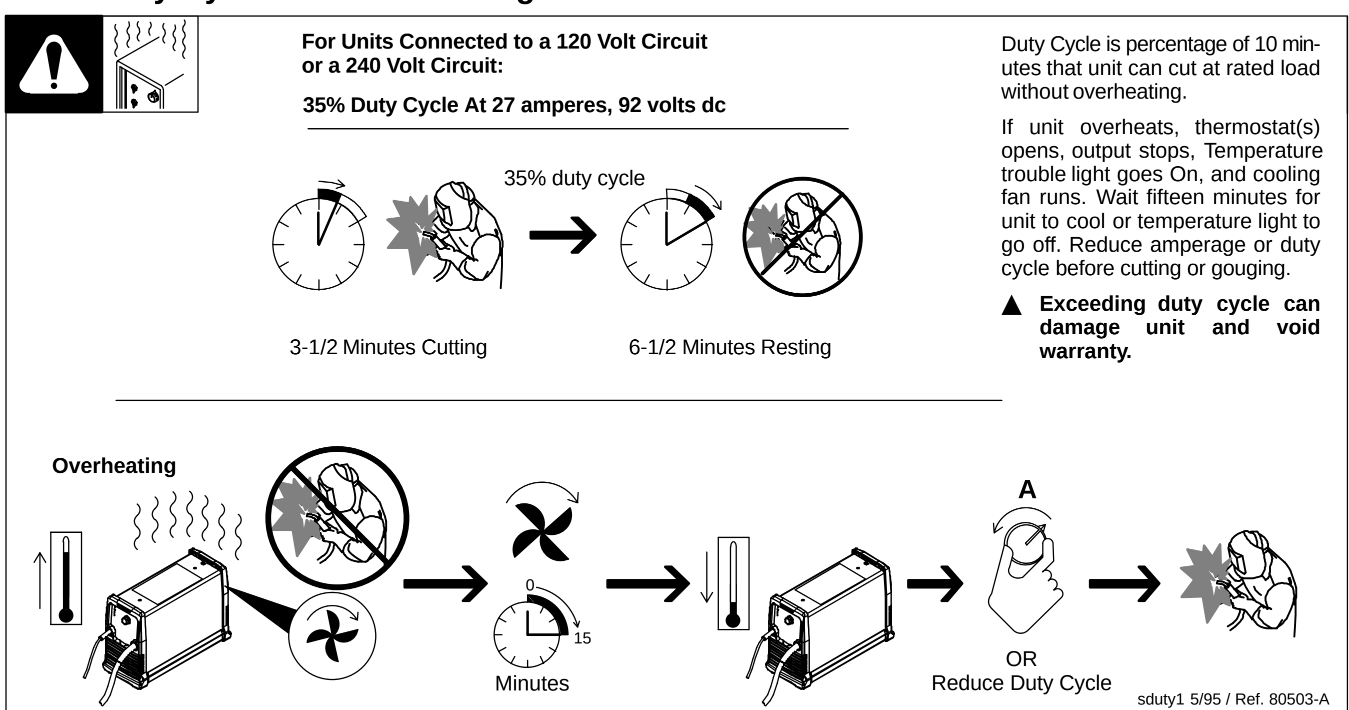
4-1. Specifications

Input Voltage	Rated Output	Amperes Input at Rated Output, 60 Hz, Single-Phase	KVA/KW	Plasma Gas	Plasma Gas Flow/ Pressure	Rated Cutting Capacity at 10 IPM	Max OCV
120 Volts ±10% (20 A)	27 A At 91 Volts DC At 20% Duty Cycle	28.8 max; 0.30*	3.4 KVA 3.2 KW	Air Or Nitrogen Only At 90−120 PSI (621−827 kPa)	4.5 CFM (129 L/min) At 60 PSI (414 kPa)	3/8 in (10 mm)	400 Volts DC
120 Volts ±10% (15 A)	20 A At 88 Volts DC At 35% Duty Cycle	20.6 max; 0.30*	2.5 KVA 2.3 KW				
240 Volts ±10% (27 A)	27 A At 91 Volts DC At 35% Duty Cycle	13.9 max; 0.13*	3.3 KVA 3.0 KW				
*While idling							

4-2. Specifications For Torch

Air-cooled torch for plasma arc cutting (PAC)
35% duty cycle
Safety interlock devices shut down power source
Safety trigger guard
Cutting capacity: see Section 4-1

4-3. Duty Cycle And Overheating

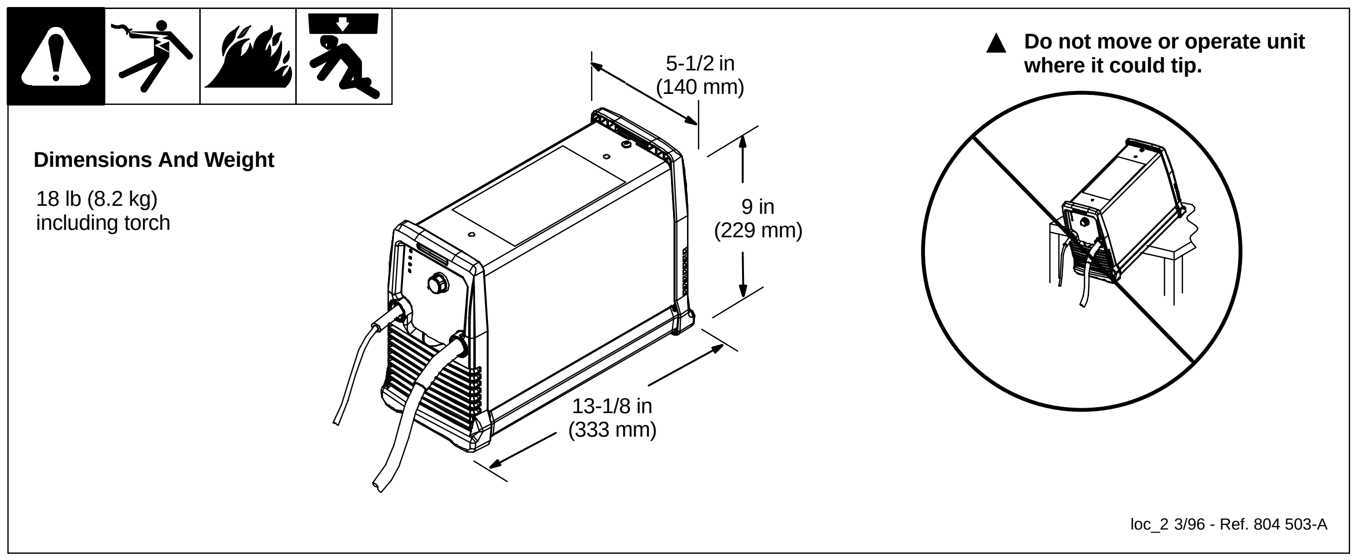


Duty Cycle is percentage of 10 minutes that unit can cut at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, Temperature trouble light goes On, and cooling fan runs. Wait fifteen minutes for unit to cool or temperature light to go off. Reduce amperage or duty cycle before cutting or gouging.

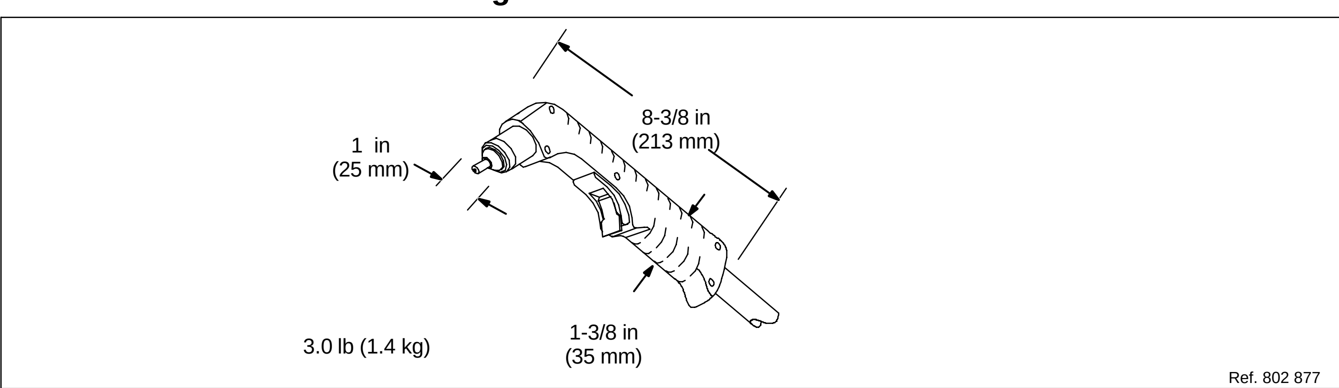
▲ **Exceeding duty cycle can damage unit and void warranty.**

4-4. Power Source Dimensions And Weight



▲ **Do not move or operate unit where it could tip.**

4-5. Torch Dimensions And Weight



4-6. Connecting Gas/Air Supply

☞ *Use only clean, dry air with 90 to 120 psi (621 to 827 kPa) pressure.*

1 Gas/Air Inlet Opening

2 Hose

3 Teflon Tape

Obtain hose with 1/4 NPT right-hand thread fitting. Wrap threads with teflon tape (optional) or apply pipe sealant, and install fitting in opening. Route hose to gas/air supply.

1

2

3

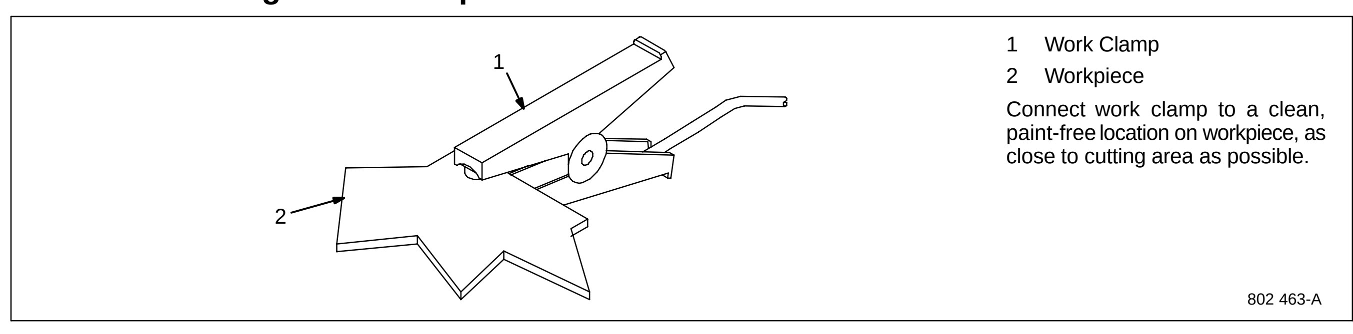
From Gas/Air Supply

Tools Needed:

9/16 in

804 505-A

4-7. Connecting Work Clamp



1 Work Clamp

2 Workpiece

Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

4-8. Electrical Service Guide For 240 VAC

▲ **CAUTION: INCORRECT INPUT POWER can damage this welding power source. This welding power source requires a CONTINUOUS supply of 60 Hz (±10%) power at ±10% of rated input voltage. Phase to ground voltage shall not exceed +10% of rated input voltage. Do not use a generator with automatic idle device (that idles engine when no load is sensed) to supply input power to this welding power source.**

NOTE ☞

Actual input voltage should not exceed ± 10% of indicated required input voltage. If actual input voltage is outside of this range, output may not be available.

	60 Hz Single Phase
Input Voltage	240
Input Amperes At Rated Output	13.9
Max Recommended Standard Fuse Rating In Amperes	
Circuit Breaker [1], Time-Delay [2]	15
Normal Operating [3]	20
Min Input Conductor Size In AWG [4]	14
Max Recommended Input Conductor Length In Feet (Meters)	91 (28)
Min Grounding Conductor Size In AWG [4]	14

Reference: 2005 National Electrical Code (NEC) (including article 630)

1 Choose a circuit breaker with time-current curves comparable to a Time Delay Fuse.

2 “Time-Delay” fuses are UL class “RK5” .

3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

▲ **Caution: Failure to follow these fuse and circuit breaker recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated branch circuit that applies to the rated output and duty cycle of the welding power source.**

4-9. Extension Cord Data



When calculating max. cord length, remember to include conductor length from line disconnect device to input power receptacle.

Input Voltage	Input Power Phase	Hertz	Conductor Size	Max. Cord Length
120 V	1	60	14 AWG	22 ft (7 m)
240 V	1	60	14 AWG	91 ft (28 m)

4-10. Connecting 1-Phase Input Power For 240 VAC

▲ **Installation must meet all National and Local Codes − have only qualified persons make this installation.**

▲ **Disconnect and lockout/tagout input power before connecting input conductors from unit.**

▲ **Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.**

1 Black And White Input Conductor (L1 And L2)

2 Green Or Green/Yellow Grounding Conductor

3 Input Power Cord.

4 Disconnect Device (switch shown in the OFF position)

5 Disconnect Device Grounding Terminal

6 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1 and L2 to disconnect device line terminals.

7 Over-Current Protection

Select type and size of over-current protection using Section 4-8 (fused disconnect switch shown).

8 Receptacle (NEMA 6-50R) Customer Supplied

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

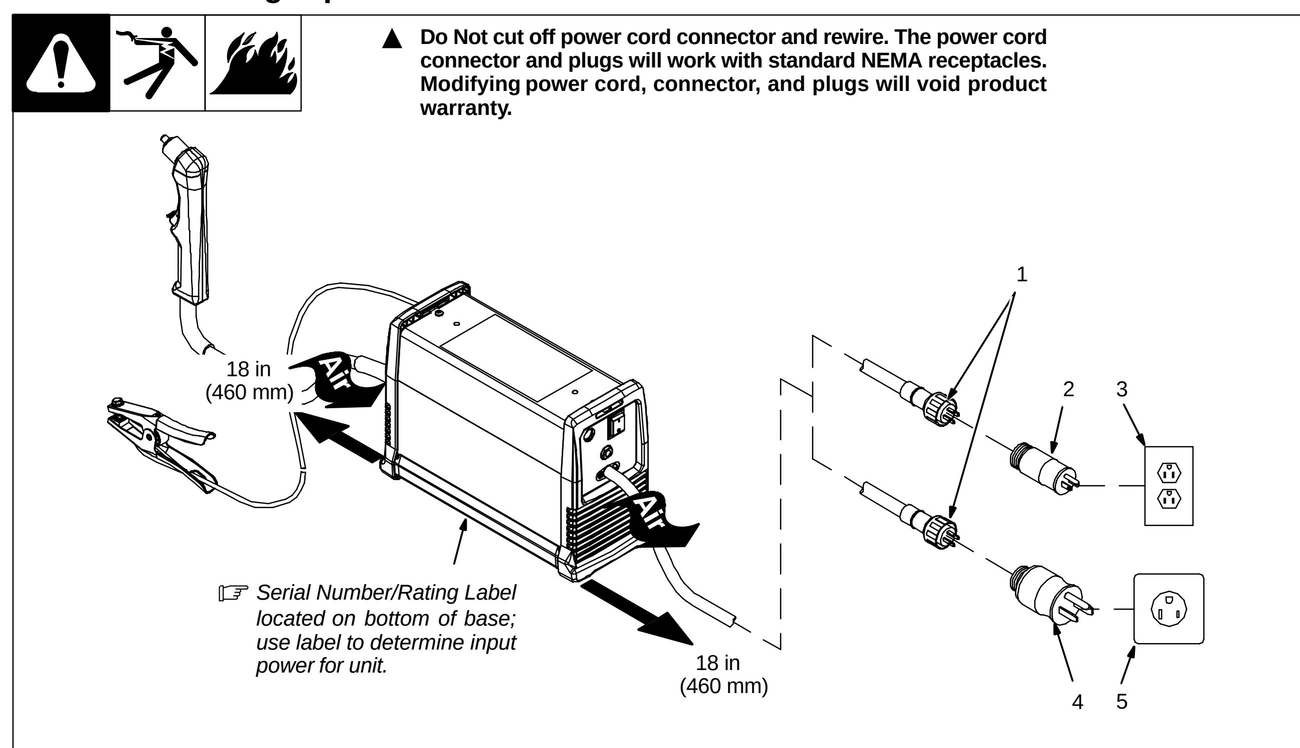
Tools Needed:



803 766-B / Ref. 802 443-A

4-11. Connecting Input Power

▲ **Do Not cut off power cord connector and rewire. The power cord connector and plugs will work with standard NEMA receptacles. Modifying power cord, connector, and plugs will void product warranty.**



▲ **Installation must meet all National and Local Codes − have only qualified persons make this installation.**

▲ **Special installation may be required where gasoline or volatile liquids are present − see NEC Article 511 or CEC Section 20.**

☞ *The Auto-Line circuitry in this unit automatically links the power source to the primary voltage being applied, either 115 or 230 VAC.*

For 120 volts ac input power, a 15 or 20 ampere individual branch circuit protected by time-delay fuses or circuit breaker is required. For 240 volts ac input power, see Section 4-8.

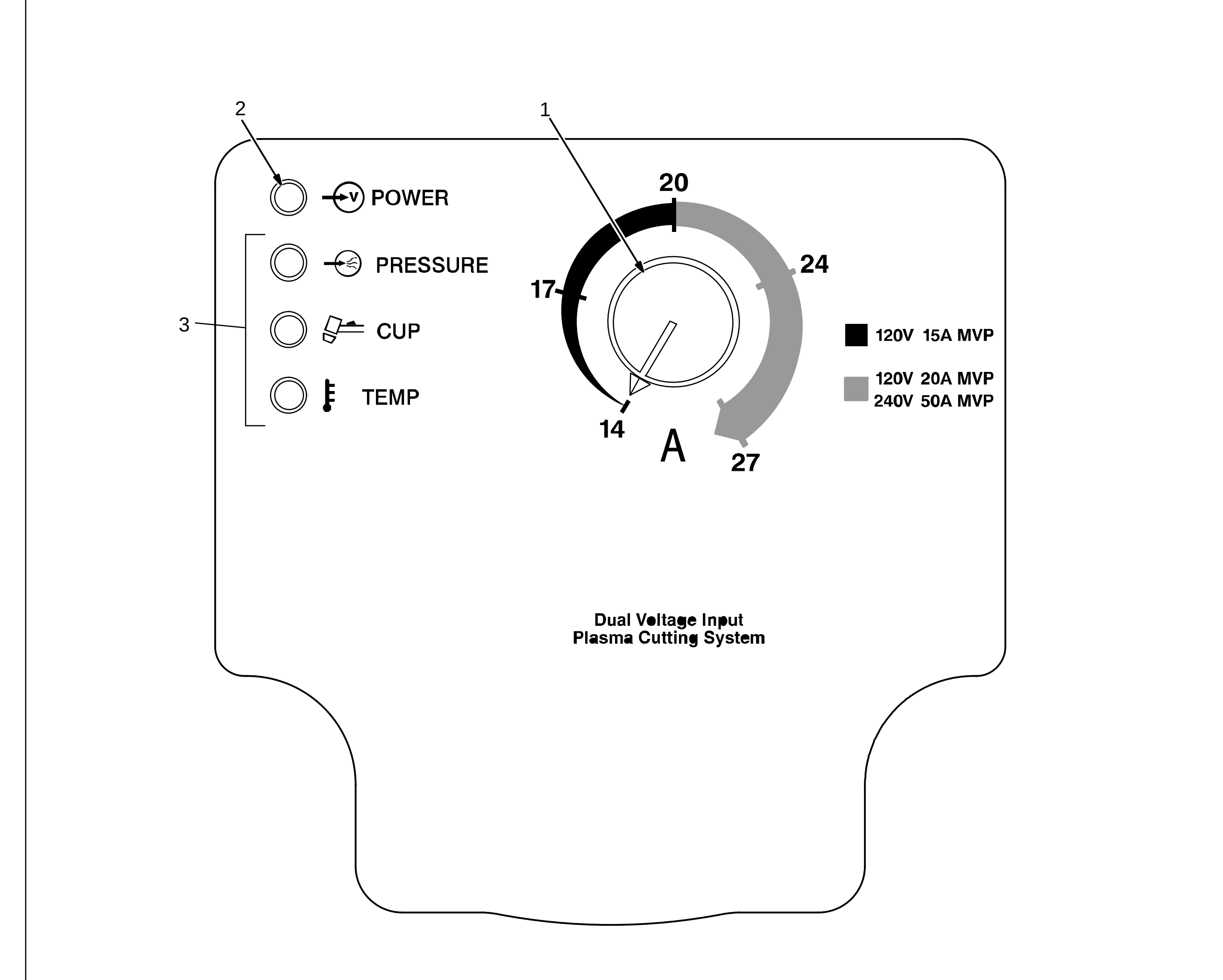
1 Power Cord Connector
2 Plug − NEMA Type 5−15P
3 Receptacle − NEMA Type 5−15R (Customer Supplied)
4 Plug − NEMA Type 6−50P
5 Receptacle − NEMA Type 6−50R (Customer Supplied)

Select plug for power supply receptacle available at site. Install plug onto power cord adapter. As threaded collar is tightened, push plug onto adapter until collar is completely tight.

Connect plug to receptacle.

SECTION 5 − OPERATION

5-1. Controls



225 175-B

1 Output Control

Use control to set cutting output.

If 22-27 amperes of cutting output is used with 120 VAC input power, and the overload protection on the input power circuit frequently opens, either reduce the cutting output and/or the cut time or find more adequate power (see Section 4-1).

2 Power Light

3 Trouble Lights (See Section 6-6)

5-2. Cutting Speed

Recommended Cut Speeds At 27 Amperes Output

	Thickness		Recommended Cut Speeds*	
	Inches	mm	ipm	mm/min
Mild Steel	16 ga	1.5	188	4,775
	3/16	4.8	40	1,016
	1/4	6.4	24	610
	3/8	9.5	14	256
	1/2	12.7	6	152

*Recommended Cut Speed is approximately 80% of maximum.

☞ *Aluminum and Stainless Steel cut speeds at these thicknesses may be reduced as much as 20%.*

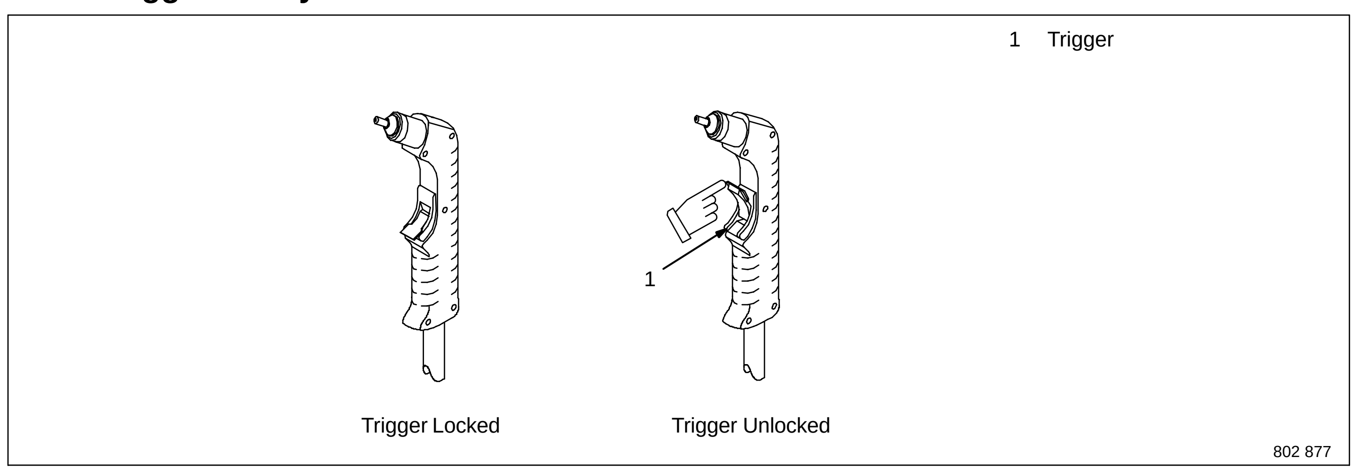
Recommended Cut Speeds At 20 Amperes Output

	Thickness		Recommended Cut Speeds*	
	Inches	mm	ipm	mm/min
Mild Steel	16 ga	1.5	162	4,115
	3/16	4.8	26	660
	1/4	6.4	18	457
	3/8	9.5	7	178

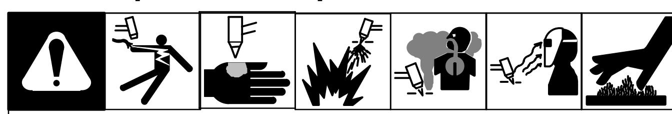
*Recommended Cut Speed is approximately 80% of maximum.

☞ *Aluminum and Stainless Steel cut speeds at these thicknesses may be reduced as much as 20%.*

5-3. Trigger Safety Lock



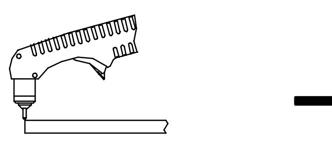
5-4. Sequence Of Operation



EXAMPLE Of Cutting Operation

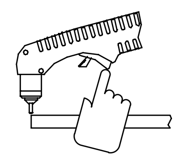
☞ ***For maximum cutting speed and tip life in non-shielded applications, use a standoff distance of 1/8 in (3.2 mm). Dragging tip will reduce tip life for non-shielded applications.***
For maximum cutting speed and tip life in shielded applications, place the drag shield directly on the workpiece.

 **The pilot arc starts immediately when trigger is pressed.**

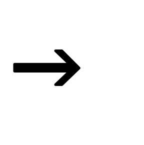


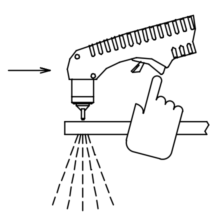
Place tip on work for drag cutting.



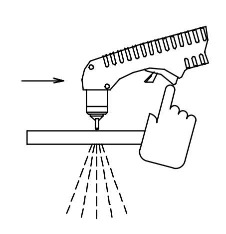


Raise trigger lock and press trigger. Pilot arc starts.

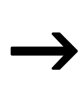


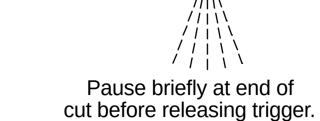


After cutting arc starts, slowly start moving torch across metal.

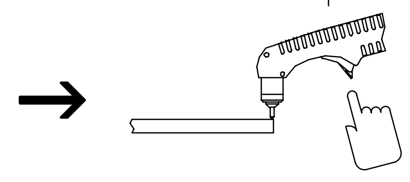


Adjust torch speed so sparks go thru metal and out bottom of cut.





Pause briefly at end of cut before releasing trigger.

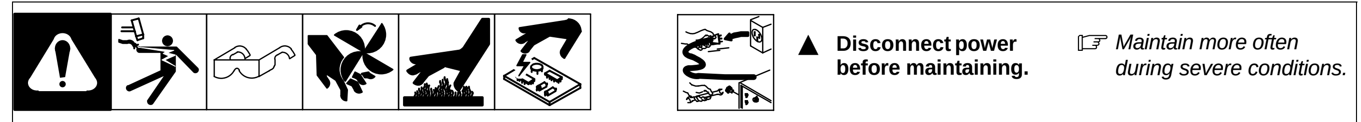


Postflow continues for 20 seconds after releasing trigger; cutting arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

Ref. 802 878

SECTION 6 − MAINTENANCE & TROUBLESHOOTING

6-1. Routine Maintenance

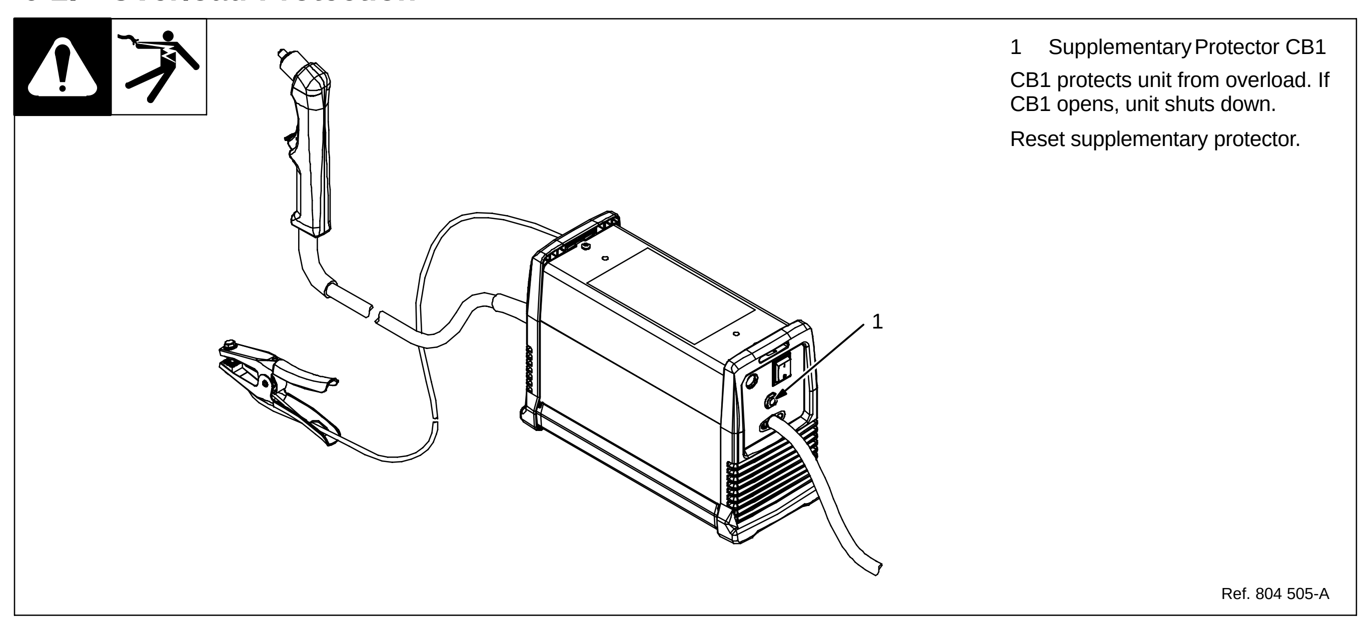


▲ **Disconnect power before maintaining.**

☞ *Maintain more often during severe conditions.*

	✓ = Check ◇ = Change ● = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				Reference
Each Use	✓ Gas/Air Pressure	✓ Torch Tip, Electrode, And Shield Cup			Section 4-6, 6-7
Every Week	✓ Shield Cup Shutdown System				Section 6-6
Every 3 Months	☆ Damaged Or Unreadable Labels	● Air Filter/Regulator	☆ Cracked Parts	✓ ☆ Gas/Air Hose	Section 6-5, 8
	✓ ☆ Torch Body, Cable				
Every 6 Months	OR ● Inside Unit				

6-2. Overload Protection

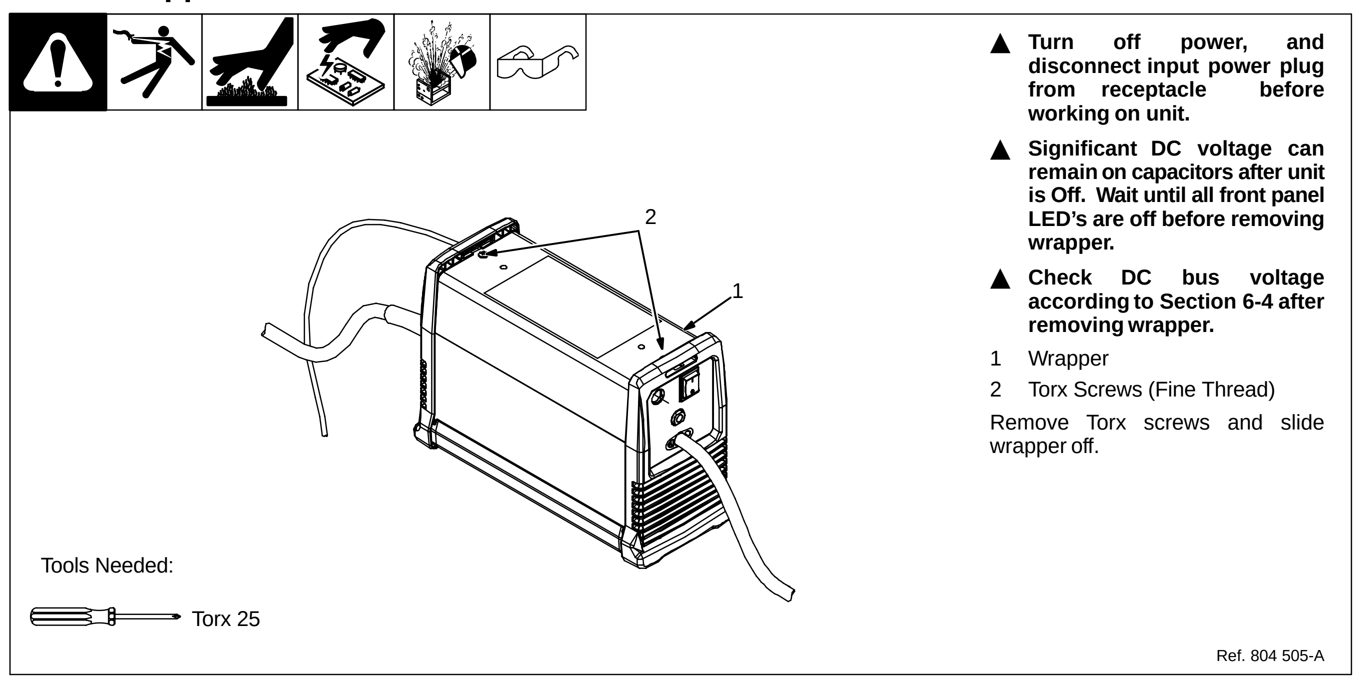


1 Supplementary Protector CB1

CB1 protects unit from overload. If CB1 opens, unit shuts down.

Reset supplementary protector.

6-3. Wrapper Removal



▲ **Turn off power, and disconnect input power plug from receptacle before working on unit.**

▲ **Significant DC voltage can remain on capacitors after unit is Off. Wait until all front panel LED's are off before removing wrapper.**

▲ **Check DC bus voltage according to Section 6-4 after removing wrapper.**

1 Wrapper

2 Torx Screws (Fine Thread)

Remove Torx screws and slide wrapper off.

6-4. DC Bus Voltage Check

▲ **440 Volts DC can be present on the capacitor bus and significant DC voltage can remain on capacitors after unit is Off. Always check the voltage on inverter assembly as shown to be sure the input capacitors have discharged before working on unit.**

▲ **Turn Off welding power source, and disconnect input power.**

▲ **Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.**

Remove wrapper from unit (see Section 6-3).

1 Circuit Board PC1

2 Voltmeter

3 TP5 Pin 5

4 TP5 Pin 1

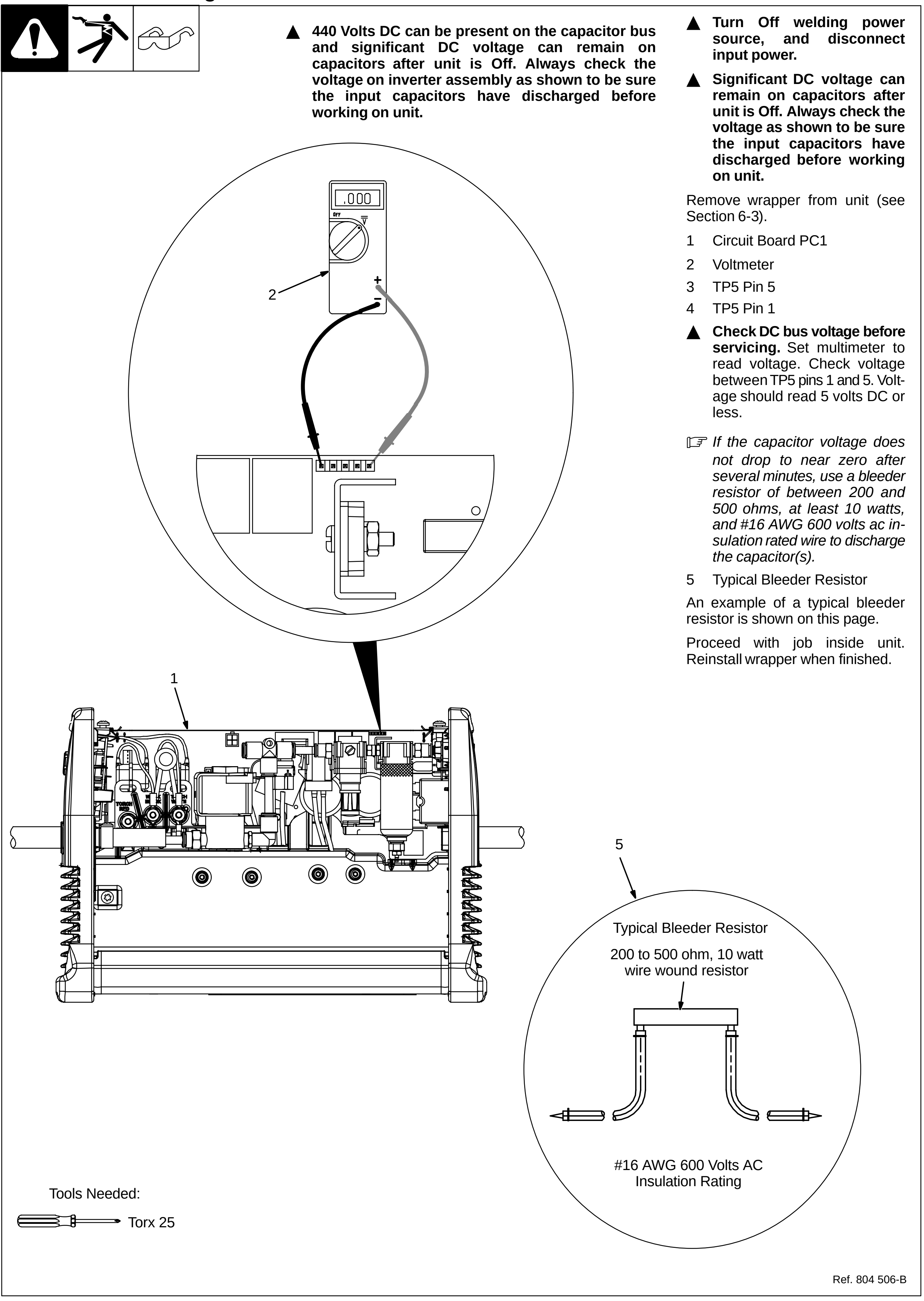
▲ **Check DC bus voltage before servicing.** Set multimeter to read voltage. Check voltage between TP5 pins 1 and 5. Voltage should read 5 volts DC or less.

☞ *If the capacitor voltage does not drop to near zero after several minutes, use a bleeder resistor of between 200 and 500 ohms, at least 10 watts, and #16 AWG 600 volts ac insulation rated wire to discharge the capacitor(s).*

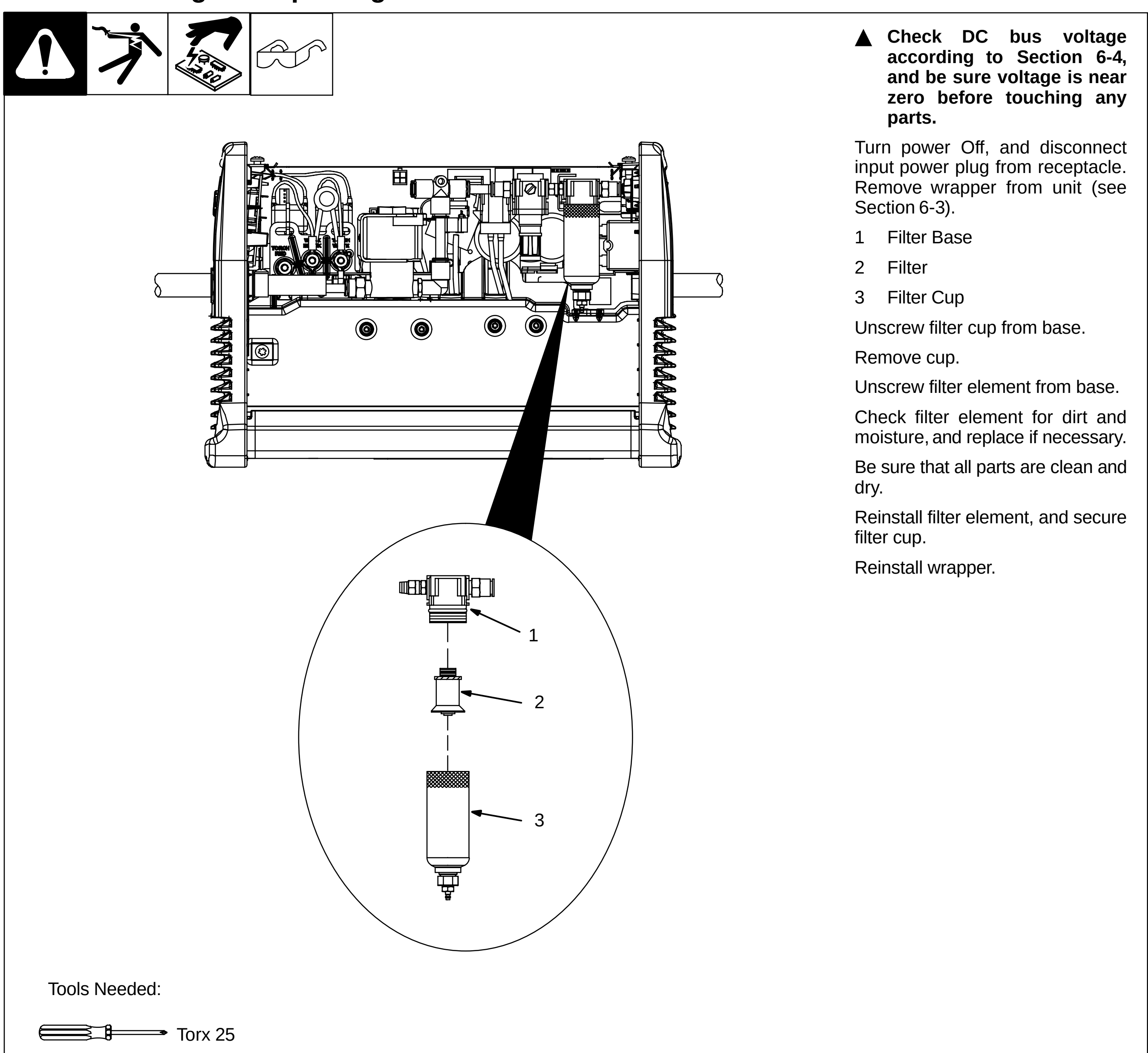
5 Typical Bleeder Resistor

An example of a typical bleeder resistor is shown on this page.

Proceed with job inside unit. Reinstall wrapper when finished.



6-5. Checking Or Replacing Filter Element



Tools Needed:

Torx 25

▲ **Check DC bus voltage according to Section 6-4, and be sure voltage is near zero before touching any parts.**

Turn power Off, and disconnect input power plug from receptacle. Remove wrapper from unit (see Section 6-3).

1 Filter Base

2 Filter

3 Filter Cup

Unscrew filter cup from base.

Remove cup.

Unscrew filter element from base.

Check filter element for dirt and moisture, and replace if necessary.

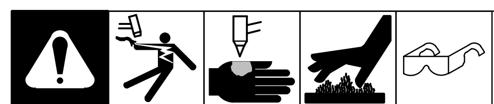
Be sure that all parts are clean and dry.

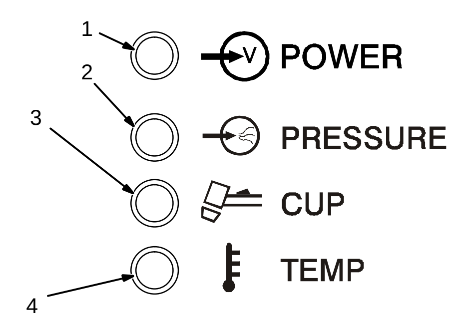
Reinstall filter element, and secure filter cup.

Reinstall wrapper.

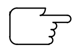
804 506-B

6-6. Overload Protection: Trouble Lights & Checking Shield Cup Shutdown System

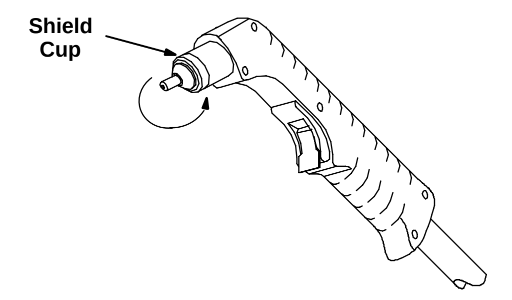




Checking Torch Shield Cup Shutdown System



Power must be reset whenever the cup shutdown system is activated.
Always turn Off power when changing or checking consumables.
Do NOT overtighten torch shield cup. Gently finger tighten cup onto torch.



1 Power Light

Light is steady if input power is okay. Light flashes for the following conditions:

a If input power is 120 volts ac, but power supply is less than 92 volts ac.

b If input power is 240 volts ac, but power supply is greater than 276 volts ac.

If certain problems occur a trouble light comes on, and output stops.

2 Pressure Light

Lights if gas/air pressure into the system is below 90 PSI (620 kPa).

Turn power Off, and check for proper gas/air pressure.

A flashing Pressure light indicates that gas/air system may be set too low, faulty, leaking or has a flow restriction.

3 Cup Light

Lights if shield cup is loose/off.

Turn Power On and loosen shield cup. If shutdown system works properly, Cup light comes on. If not, turn power Off and have a factory authorized service agent check unit.

If system works properly, retighten cup and reset power.

Turn power Off, and check shield cup connection (see torch Owner's Manual). Power must be reset whenever the cup shutdown is activated.

A flashing Cup light indicates that the torch consumables are stuck or worn and should be inspected and/or replaced (see Section 6-7).

Check shield cup shutdown system once a week.

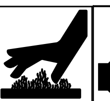
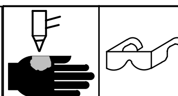
4 Temperature Light

Lights if power source overheats or when ambient temperature is below −35° C (−31° F) (see Section 4-3).

Ref. 225 175-B / Ref. 802 877

6-7. Checking/Replacing Retaining Cup, Tip, And Electrode



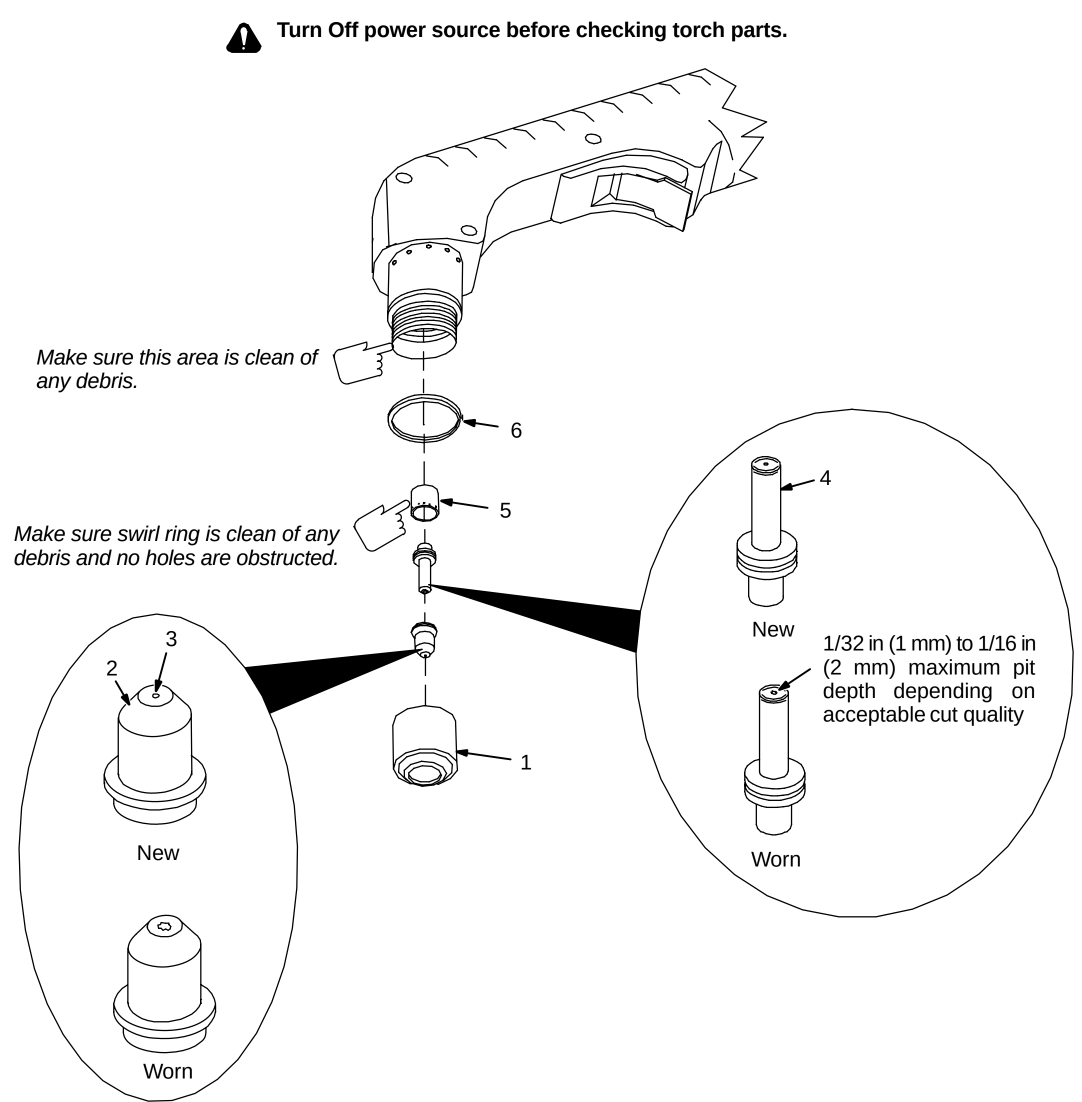



 **Overtightening will strip threads. Do not overtighten retaining cup during assembly. Do not cross-thread parts causing stripping. Use care during torch assembly and parts replacement.**

 **Inspect shield cup, tip, and electrode for wear before cutting or whenever cutting speed has been significantly reduced. Do not operate torch without a tip or electrode in place. Be sure to use genuine replacement parts.**

☞ *A good practice is to replace both the tip and electrode at the same time.*

Turn Off power source before checking torch parts.



Turn Off power source.

1 Shield Cup

Remove shield cup. Check cup for cracks, and replace if necessary.

2 Tip

3 Opening

Remove tip. Check tip, and replace if opening is deformed or 50% oversize. If inside of tip is not clean and bright, clean with steel wool. Be sure to remove any pieces of steel wool afterwards.

4 Electrode

Check electrode. If center has a pit more than a 1/16 in (2 mm) deep, remove and replace electrode.

5 Swirl Ring

Remove swirl ring. Check ring, and replace if side holes are plugged.

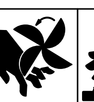
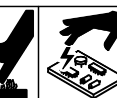
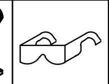
6 O-Ring

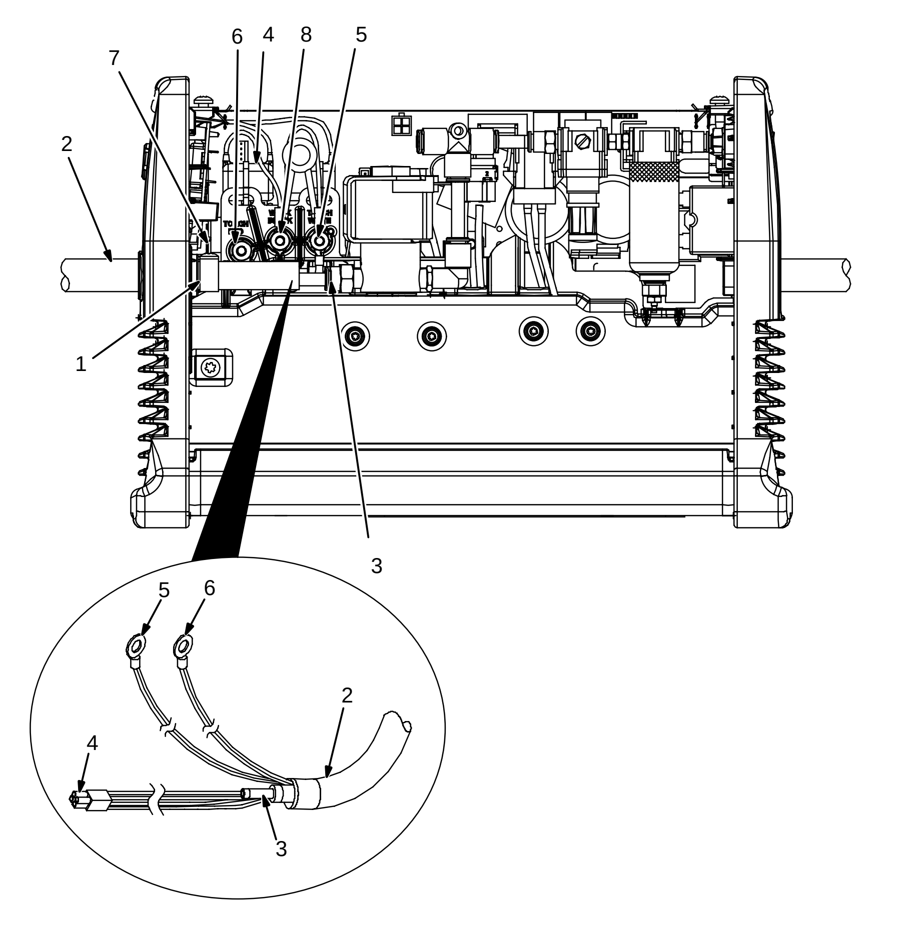
Check O-ring for cracks or worn spots, and replace if necessary.

Carefully reassemble parts in reverse order.

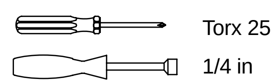
6-8. Torch And Work Cable Connections





Tools Needed:



Torx 25

1/4 in

▲ **Check DC bus voltage according to Section 6-4, and be sure voltage is near zero before touching any parts.**

If torch or work cable needs to be removed or replaced, proceed as follows:

Turn power Off, and disconnect input power plug from receptacle. Remove wrapper from unit (see Section 6-3).

Torch Connections

Remove existing torch cable from unit.

1 Strain Relief

Loosen strain relief screw.

2 Torch Cable

Insert cable through strain relief, but do not tighten.

3 Air Line Connector

Insert air line connector into solenoid fitting. Pull slightly on torch to set fitting.

4 Plug PLG1/Receptacle RC1

Connect PLG1 from torch to receptacle RC1 on end of wiring harness connected to circuit board PC1.

5 Ring Terminal And TORCH WHITE Terminal

Connect ring terminal on end of white leads to TORCH WHITE terminal.

6 Ring Terminal And TORCH RED Terminal

Connect ring terminal on end of red leads to TORCH RED terminal.

Tighten strain relief screw.

Work Cable Connections

Remove existing work cable from unit.

7 Strain Relief

Loosen strain relief screw.

☞ *Be sure to allow some work cable slack inside the unit.*

Insert work clamp lead through strain relief, but do not tighten.

8 Work Lead Ring Terminal And WORK BLACK Terminal

Connect ring terminal on end of work clamp lead to terminal labeled WORK BLACK terminal. Route lead along torch lead bundle.

Tighten strain relief screw.

Reinstall wrapper.

Ref. 804 506-B / Ref. 802 860

Notes

⚠ WARNING



ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

PC1
POWER & PROCESS PCB

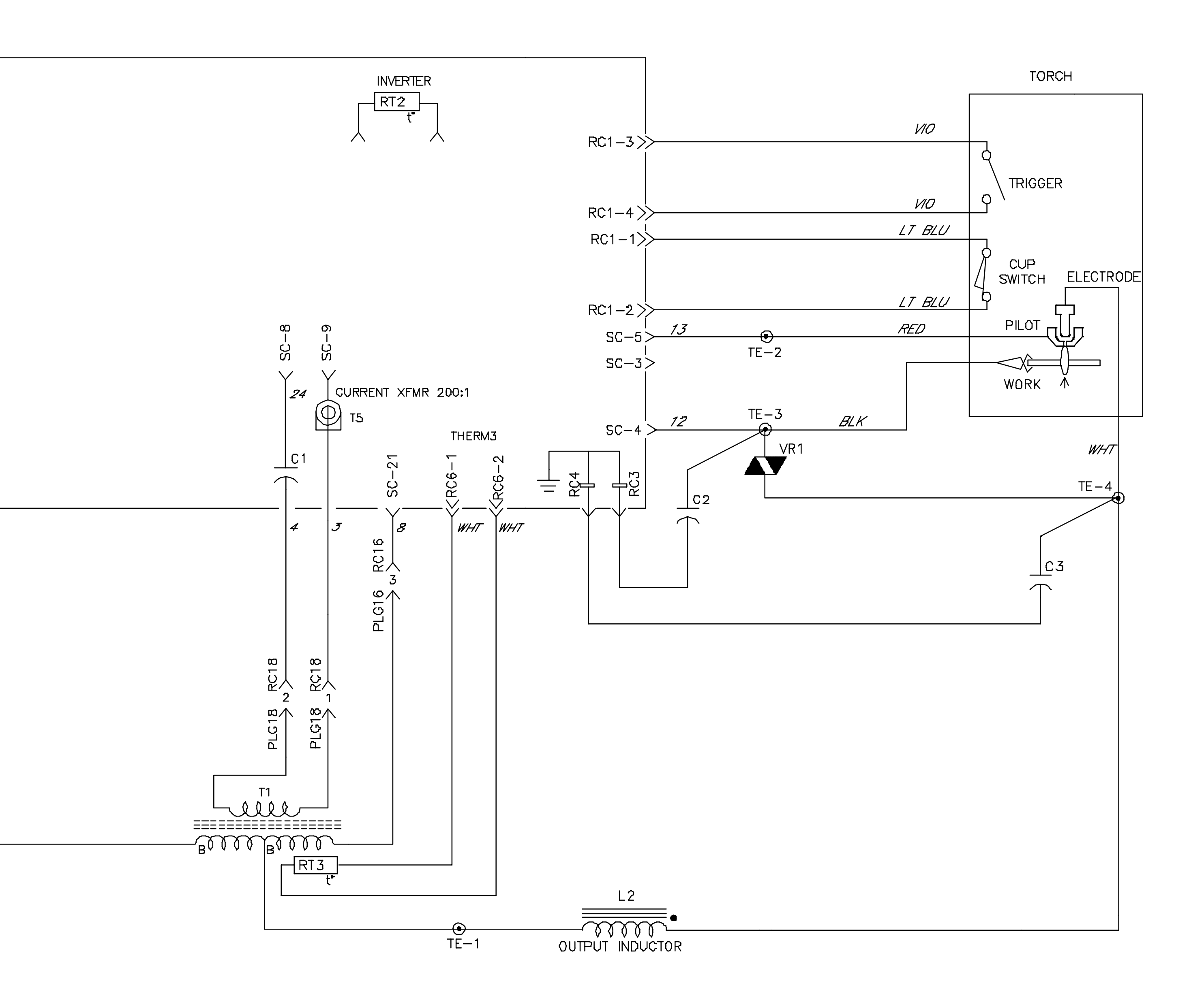
RCPT/PLG#:	FUNCTION:
RC1/PLG1	TORCH
RC2/PLG2	POT/LED
RC3	GND
RC4	GND
RC5/PLG5	AS1/FAN
RC6/PLG6	RT3
RC7	GND
RC8	GND
RC10/	PGM U10
RC11/	PGM U15
RC13	GND
RC14	GND, REAR COVER
RC15	GND, FRONT COVER
RC16/PLG16	T1, SEC
RC17/PLG17	INPUT INDUCTOR
RC18/PLG18	T1, PRI

L1 BLK S1 11 CB1 2 SC-12
L2 WHT 1 SC-13
GRN/YEL RC8
RC14 TO COVER REAR G/Y SC-15
SC-2
G/Y SC-14
RC15 TO COVER FRONT G/Y SC-1
FM RED RC5-1 BLK RC5-2
AS 1 9 RC5-3 10 RC5-4
G/Y RC13 SC-22
RC7 G/Y RC2 PLG2 SC1
PC2 FRONT PANEL PCB
PRESSURE TRANSDUCER (PS1)
SC-20 SC-10 SC-11 7 6 5 RC16 PLG17 PLG17 1 1 2 PLG16 RC17 RC17
L1 INPUT INDUCTOR

FRICTION LUG CONNECTION (RC)
SOLDERED IN LEAD (SC)
CONNECTOR AND PLUG (RC)
BOLT THROUGH CONNECTION (RC)

INPUT AIR
AIR FILTER
REGULATOR
SOLENOID VALVE (AS1)
TO TORCH
60–65PSI @ 4.3 CFM
PNEUMATIC CIRCUIT

Figure 7-1. Circuit Diagram



INVERTER
RT2
TORCH
RC1-3
VIO
TRIGGER
RC1-4
VIO
RC1-1
LT BLU
CUP SWITCH
ELECTRODE
RC1-2
LT BLU
PILOT
SC-8
SC-9
SC-5
13
TE-2
RED
SC-3
WORK
24
CURRENT XFMR 200:1
T5
SC-4
12
TE-3
BLK
THERM3
VR1
WHT
C1
SC-21
RC6-1
RC6-2
RC4
RC3
C2
TE-4
4
3
8
WHT
WHT
RC16
3
PLG16
C3
RC18
2
RC18
1
PLG18
PLG18
T1
B
B
RT3
L2
TE-1
OUTPUT INDUCTOR

224 682-B

SECTION 8 − PARTS LIST

8-1. Recommended Spare Parts

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Recommended Spare Parts	
. . . .		225970	. . PLUG KIT,ADAPTER (115V/15A) (230V/50A) (including)	1
. . . .		219261	. . . . ADAPTER,POWER CABLE 5−15P (115V/15A)	1
. . . .		219258	. . . . ADAPTER,POWER CABLE 6−50P (230V/50A)	1
. . . .		225803	. . ELEMENT,FILTER AIR	1
. . . .		225615	. . ICE− 27T,12FT HAND HELD (REPLACEMENT)	1
. . . .		225916	. . CABLE,WORK 12 FT 8 GA W/CLAMP STRAIN RLF & TERM	1
. . . .		227 745	. . LABEL,ICE−27T/C CONSUMABLES/MVP	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

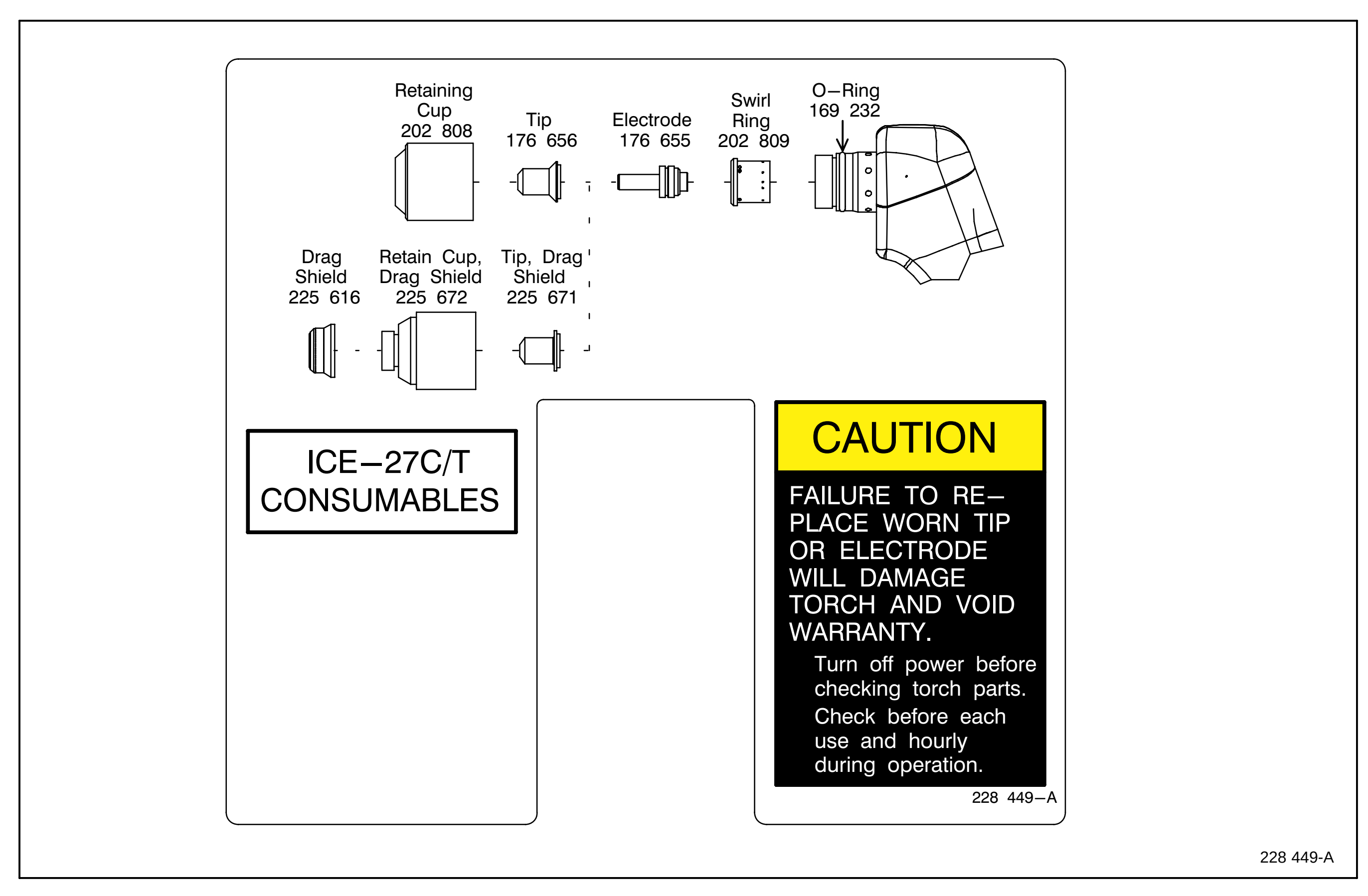
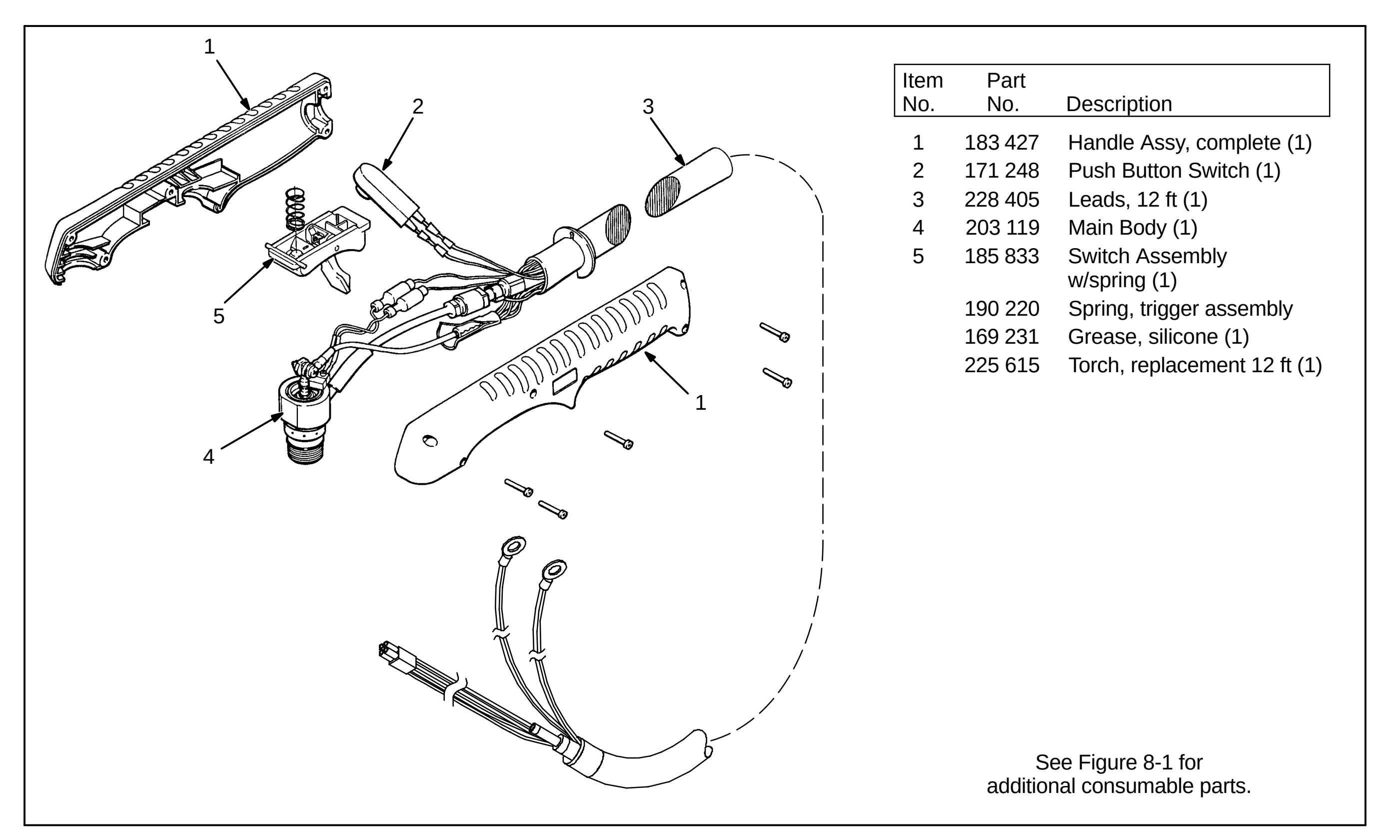


Figure 8-1. Consumable Parts For ICE-27C/T

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.



Item No.	Part No.	Description
1	183 427	Handle Assy, complete (1)
2	171 248	Push Button Switch (1)
3	228 405	Leads, 12 ft (1)
4	203 119	Main Body (1)
5	185 833	Switch Assembly w/spring (1)
	190 220	Spring, trigger assembly
	169 231	Grease, silicone (1)
	225 615	Torch, replacement 12 ft (1)

Figure 8-2. Torch, ICE-27T

NOTE ☞	*A complete Parts List is available on-liine at www.MillerWelds.com*

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes



Effective January 1, 2007
(Equipment with a serial number preface of “LH” or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.



LIMITED WARRANTY − Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Bernard-Branded Mig Guns (No Labor)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches and Subarc (SAW) Guns
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory (Kits)
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller’s True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer’s warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller’s option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer’s risk and expense. Miller’s option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.



Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip



For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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